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TREATMENT OF CHRONIC ULCER OF THE STOMACH AND DUODENUM

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The treatment of gastric and duodenal ulcer must be considered both from the medical and surgical viewpoint. Every ulcer, except in cases of perforation, pyloric stenosis with commencing dilatation of the stomach or suspected malignant degeneration, should be given the benefit of medical treatment before being subjected to surgery. Under the medical treatment there are several methods which deserve special mention.

The Rest and Rectal Feeding Method of Williams and Donken.—The essentials are rest in bed, no nourishment by mouth for two weeks, and nutrient enemata every three hours. To insure success I use the following technic: The bowels are first washed with warm salt solution or plain water and, after one hour's rest, a warm nutrient enema at 95° F. is given through a soft tube (preferably the Murray tube) introduced one foot. The funnel is elevated only two feet, in order to provide a gradual flow. The patient lies in the dorsal or left lateral position, and is required to rest quietly for an hour. The cleansing enema may not be required more than two or three times daily, if absorption is good and the bowel is free from mucus. I have found some difficulty in giving the nutrient enemata every three hours, as recommended by these authors, and when I have succeeded, have usually found it advisable to give a smaller quantity. Patients will retain an enema every four or six hours, when the three-hour interval causes irritation. The addition of a few drops of the tincture of opium will often make it possible to retain an enema that would otherwise be expelled.

We may choose from the following formulae:—

Ewald's Enema—

A. Two or three eggs are beaten with cold water, ℥ss.

B. Prepared cereal, ℥ss is dextrinized by heat and boiled with ℥ss of a 20% solution of grape sugar, and to this ℥ii of claret is added. When lukewarm stir in the beaten eggs and add gr. xv of salt.

Boas Enema—

Milk, ℥viii.
Yolks of two eggs.
Salt, gr. xv.
Red wine, ℥ss.
Wheat flour, cooked, ℥ss.

Foot note—This paper does not refer to malignant, tubercular or syphilitic ulcer.

Boardman Reed's Enema—
Milk, ℥viii.
Raw eggs, beaten, No. ii.
Salt, gr. xv.
Brandy, ℥ss.
Sometimes sugar or glucose.
Von Leube's Enema—
Chopped beef, ℥v-x.
Pancreas (hog or cow, and fat free), ℥iss-℥iii.
Fat, if desired, ℥i-iss.
Water, ℥v.

In selecting an enema, remember that glucose and dextrine are absorbed more completely than other food products, that alcohol up to 2% is also well absorbed, and that the yolk of egg is the best form in which to administer fat. The enema of Boas or Boardman Reed, the milk being fully peptonized, is usually chosen, but when the milk is not well absorbed, Ewald's formula may be useful. The above method of Williams and Donken is extreme and unnecessary, except in cases of unusual irritability of the stomach, in which the simplest foods are not tolerated by mouth. However, for a short period of time (two or three days) it is an excellent way to begin the treatment in some cases.

The Milk and Neutralization Method of Debove includes rest in bed and an exclusive milk diet, with alkalies in sufficient quantity to neutralize all hydrochloric acid. Give one glass of milk every two hours for eight feedings daily. Give soda bicarbonate gr. x and prepared chalk gr. iii every hour while awake and during the night, if in pain, or three glasses of milk may be given, three times daily and during the four hours succeeding each meal, the powder is given every half hour and every hour, for the remainder of the time when awake. This is to be continued for one or two weeks, and then the diet is gradually increased, following the Von Leube tables of digestibility and continuing the alkali. I frequently have occasion to make use of this method, particularly in cases complicated with continuous secretion.

Conheim's Olive Oil Treatment consists of the administration of olive oil, ℥ss to ℥iii, given through the stomach tube two or three times daily.

Kussmaul's Bismuth Treatment consists of giving large doses of bismuth subnitrate. The technic is as follows: The first thing in the morning the stomach is washed thoroughly, and then ʒiiss to ʒv of bismuth subnitrate, in ℥vi of water is introduced through the tube. The patient is then required to lie in such a position that the bismuth will precipitate over the ulcer area, which will take place in five or ten minutes, after which the water may be allowed to run off, or if the tube causes irritation it is removed at once, leaving the fluid in the stomach. This treatment is given once daily at first, later less frequently, as symptoms improve.

In Gerhardt's Silver Nitrate Treatment begin with a solution gr. iv in ℥iv of water, and give ℥ss of this in a wineglass of distilled water three times daily, on an empty stomach. The dose is then increased to gr. ivss in ℥iv of water. One or two bottles are taken and then gr. vi in ℥iv of water is given, until one or two bottles are taken. In a modified form this is an important part of the treatment of most cases of ulcer.

The Von Leube Treatment, as modified by Ewald, consists of rest in bed, hot flaxseed poultices to the epigastrium and the administration of Carlsbad Muhlbrunnen ℥viii (temperature 122° F.), containing ʒii to ʒiv of Carlsbad salts, morning and evening. Nutrient enemata are given at first, with no food by mouth for several days, followed by milk, to which labferment is added, alone or mixed with flour soup. This is given at first in small quantities and gradually increased. We may substitute, or combine with this, a bland pigeon or chicken broth. If there is no pain, the quantity of flour soup is increased; then, the legumens and soft foods, such as sago, tapioca, etc., are added. Meat is not given until the third week and consists of raw, scraped ham and breast of fowl. About the same time he allows rolls and zwiebach, softened in cocoa.

Von Leube has devised the following series of diet tables, based upon the degree of digestibility, for use in making gradual dietetic changes.

DIET No. 1.

When digestion is greatly reduced:—bouillon, meat solution, milk, raw or soft-boiled eggs.

DIET No. 2.

Boiled calve's brain, boiled thymus, boiled chicken and pigeon, which are enumerated in order of their digestibility, gruels and milk mushes, made with tapioca and white of egg.

DIET No. 3.

Add cooked or raw beef, raw ham, a small quantity of mashed potato, stale wheat bread and a little coffee, or tea with milk. The beef is very digestible, if prepared as follows:—Keep for some time, scrape with a dull spoon and roast the pulp in fresh butter.

DIET No. 4.

Add roast chicken, roast pigeon, venison, partridge, roast beef medium to rare, veal from the leg, pickerel, boiled shad, macaroni, bouillon with rice, young, finely-chopped spinach. A little wine may be taken one to two hours before eating.

After this fourth diet the patients are allowed more latitude, increasing the variety and quantity gradually. They refrain from gravies, vegetables, salads, preserves and fruits for some time. A baked apple is the first fruit allowed.

The Lenhartz Treatment contrasts strongly with the restricted diet of Von Leube. Lenhartz observes that these patients are usually in poor physical condition, and usually have hyperacidity, and considers it wise to give nourishment from the beginning, even in cases of hemorrhage.

The following, taken from Friedenwald and Ruhrah, shows his method:—

Day after last hemorrhage.		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Eggs,	No.	2	3	4	5	6	7	8	8	8	8	8	8	8	8
Sugar,	gm.	...	...	20	20	30	30	40	40	40	40	40	50	50	50
Milk,	cc.	200	300	400	500	600	700	800	900	1000	1000	1000	1000	1000	1000
Raw scraped beef,	gm.	...	...	...	...	...	35	2x35	2x35	2x35	2x35	2x35	2x35	2x35	2x35
Milk cooked with rice,	gm.	...	...	...	...	...	....	100	100	200	200	300	300	300	300
Zwiebach,	gm.	...	...	...	...	...	....	....	20	40	40	60	60	80	100
Ham, raw,	gm.	...	...	...	...	...	....	....	....	....	50	50	50	50	50
Butter,	gm.	...	...	...	...	...	....	....	....	....	20	40	40	40	40
Calories,	gm.	280	420	637	779	955	1135	1388	1721	2138	2478	2941	2941	3007	3073

The eggs and milk are given ice cold and in teaspoonful doses. A patient who has had a recent hemorrhage is kept in bed fourteen days and an ice bag is applied to the abdomen for ten days.

As to the relative advantages of the Von Leube and Lenhartz diet, there is still a great difference of opinion. I recognize the theoretical advantages of a diet of liberal caloric value, and the results reported are encouraging. In my own practice, most of the patients have improved under this treatment, but at present I am not willing to accept it as the most rational form of treatment, since, in my judgment, it does not produce the most favorable conditions for the healing process. Von Leube thinks the Lenhartz treatment is not free from danger, and that absolute rest is necessary for the formation of a thrombus which will check the tendency to hemorrhage. I believe his ideas are correct and that the Lenhartz treatment should not be used in cases of recent hemorrhage.

Einhorn's Method of Duodenal Feeding.—The duodenal tube is passed into the duodenum, well beyond the ulcer area. Eight feedings are given daily, consisting of plain milk, to which may be added other nourishment in fluid form, and of the proper consistency to flow through the tube, the amount depending upon the patient's ability to digest it. He recommends covering the tube, at the point where it comes in contact with the ulcer, with the following preparation:—

Protargal, 5 parts.
Agar, 5 parts.
Gelatine, 18 parts.
Glycerine, 25 parts.
Water, qs.

Mix, heat and apply to the tube at the point desired. When coagulated, place in a 40% formaline solution for one-half hour.

In suitable cases, we can, by the use of the duodenal tube, secure the complete rest of the stomach, insisted upon by Von Leube and at the same time give a diet of high caloric value, as recommended by Lenhartz, although we do not fulfill his requirement of keeping the hydrochloric acid constantly in chemical combination. I have found it desirable to keep the patients under observation much longer than is usually recommended, three months being the time assigned to active treatment, after which, for a year, certain dietetic and hygienic rules should be observed, as prophylaxis against recurrence. For the first twenty-one days the patients are kept in bed, and for the following two or three weeks they rest most of the time on a lounge, or in a reclining chair, after which they are allowed to exercise moderately. They are especially instructed to lie down for an hour after meals. Gentle massage of the extremities is practiced to prevent muscular relaxation. The further details of the treatment will vary.

If symptoms are acute (recent or threatened hemorrhage, persistent vomiting, acute pain) the method recommended by Williams and Donken is used for several days.

An ice bag is placed over the epigastrium for alternate hours, or if pain is severe and hemorrhage is not threatened, flaxseed poultices are applied at intervals depending upon the persistence of symptoms, and no food is given by mouth. After two or three days we try albumin water by mouth frequently and milk two parts, with lime water one. The treatment is continued for about a week, or longer, if acute symptoms have not subsided, after which we proceed as we would begin in a case with subacute, or chronic symptoms.

It is then necessary to determine whether to use the duodenal feeding, or to follow one of the older methods of diet. I think it is desirable to use the tube, whenever it can be done, without causing irritation, the indications of which are a feeling of gastric discomfort, peristaltic unrest, or acid regurgitation. On account of the possibility of irritation, I do not advise it in cases of recent hemorrhage. The tubes are easily prepared, as needed, by cutting one-sixteenth-inch pure gum rubber tubing into four-foot lengths. The distal end is weighted by slipping inside the tube two or three shot, a little larger than the natural calibre of the tube, or using the metal balls manufactured for the bearings of roller skates. Several perforations are burned in the tube, proximal to the weight. To introduce the tube, place the weighted end well back on the tongue and have the patient take repeated swallows of water, and, as he does this, push it down, an inch or two at a time, for a distance of twenty inches. After a twenty-minute rest in the recumbent position, and while lying on the right side, ten inches more are introduced. In an hour, or less, it will usually work through the pylorus, but before we begin feeding we aspirate the alkaline, bile-stained duodenal fluid to determine that it is in the proper place and is patent. The tube is fastened at the angle of the mouth with adhesive plaster and is left in situ throughout the treatment, if it continues to work satisfactorily.

It is necessary to proceed cautiously with the nourishment, until we have demonstrated the ability of the intestines to take care of it, after which the quantity is rapidly increased. The food is given warm and introduced slowly, regulating the flow by a Murphy drip attachment at the rate of about one hundred drops a minute. If these rules are observed there is seldom any discomfort. The feedings are given at seven, nine, eleven, one, four, six, eight and ten. Start with peptonized milk, six ounces, quickly increasing to ten or twelve ounces, after which add the albumin of one egg, and then a whole egg and ℥i of lactose. We may be able to add ℥ss to ℥i of cream to each feeding, giving a diet of about three thousand calories, on which we are able not only to maintain nutrition, but to cause an actual increase in weight and at the same time prevent the anemia that follows a diet of low caloric value. It is

important to introduce a little water through the tube after each feeding.

If there are symptoms of peristaltic unrest give five drops of the tincture belladonna three or four times daily, by mouth, and if the secretion of hydrochloric acid continues, give milk of magnesia and soda bicarbonate by mouth as needed.

This treatment is continued for two to six weeks, after which food is gradually given by mouth, beginning with Von Leube's diet, No. 1, and in a few days advancing to No. 2, continuing it for about seven to ten days, then using Diet No. 3 for a week. Diet No. 4 is kept up for yet another week. From that time on the regulations are as for prophylactic treatment.

If we find it advisable not to use the tube, the preliminary treatment is much like that described above, in cases with symptoms of acute irritation, except that we supplement rectal alimentation with uncooked egg albumin and milk by mouth. At first lime water is added to the milk, or citrate of soda gr. v, to each glass, to prevent the formation of hard curds. The milk is to be sipped slowly. The quantity is limited to two quarts in twenty-four hours, eight ounces being given at seven, nine, eleven, one, four, six, eight and ten. After three or four days, to increase the caloric value of the food, we add the yolk of one egg, and also lactose 3i, or 3ii. If we can reach two thousand calories on this combination, without gastric discomfort, the diet is followed for two weeks, after which we add to the milk some thoroughly cooked preparation of rice or wheat, continuing this for another week, and then adding soft eggs, crackers softened in milk, boiled calve's brain and thymus, boiled chicken and squab, raw scraped beef sandwiches, custards, tapioca, thoroughly cooked wheat or rice cereals, fresh butter, stale bread and purees of green vegetables. The additions are made one at a time, practically in the order enumerated and usually extend over a period of six weeks. From this time on, the diet is gradually increased, using the later diet tables of Von Leube or Penzoldt.

As soon as feeding by mouth is begun, or before, if there are symptoms of acid secretion, an alkali is administered fifteen minutes after fluid food, and one-half to one hour after solid food; or, when continuous secretion is present, we may give the alkali every hour while awake. Further details will be given in discussing over-secretion. At night, the patients take two teaspoonfuls of bismuth subcarbonate suspended in olive oil, or, if the oil disagrees, in water. In the morning, they take gr. ¼ of silver nitrate in water 3ss, interrupting this part of the treatment after two weeks. Atropine sulphate is given in small doses, gr. 1/500 three or four times daily, particularly when we reach the stage of solid food and less frequent feedings. Following the active dietetic and medicinal treatment, the patients are kept under close observation for several months. Women are instructed to rest during the menstrual period for the same length of time.

Prophylactic Treatment is important in threatened ulcer, and to prevent recurrence. Instructions are given as to general hygienic living, the avoidance of excesses, physical, sexual and mental; proper mastication, avoiding hot or cold drinks and food, alcohol, tobacco, tea, coffee, condiments, meats in excess, acids, fried stuffs and, in fact, all foods that tend to increase acidity.

The gastric secretions are studied at regular intervals and, when excessive, appropriate remedies are given.

The various conditions which reflexly affect gastric secretion must be controlled, i. e., gall-bladder trouble, chronic appendicitis, colitis and intestinal stasis. The last is very important, as it seems to be a factor in most cases of ulcer.

It will occasionally be necessary to try some form of ambulatory treatment, but we should make it clear to the patients that usually this proves to be only palliative. Often they will gain greatly, however, if placed on a bland diet, principally milk, or raw eggs, gradually adding Von Leube's diets, No. 2 and No. 3. They are required to rest for an hour after meals and take the nitrate of silver treatment after the method of Gerhardt, with

bismuth subcarbonate ʒii, in olive oil, at bed time, and an alkali, with belladonna, or atropine, to control acidity.

Reference should be made to certain conditions which will require special treatment.

Anaemia is an important symptom to control, but is apt to be aggravated by a restricted diet. Osler and Bassler recommend albuminate of iron.

Ewald gives the following:—

℞ 3% sol Sesquichloride of Iron ʒiv.
Sig., ʒi t.i.d. in a wineglass of albumin water, i. e., one part egg albumin and two parts of water, to be taken through a glass tube.

Personally, I prefer to keep these drugs out of the stomach, during the early days of treatment, and give hypodermatically, once daily, for six to ten days, the cacodylate of iron, to be followed by a rest of three days and then repeated. Later, if needed, I give one of the organic iron preparations.

Over Secretion is present in most cases of ulceration and if not controlled may prevent a cure. Use the extract of belladonna gr. 1/20, or atropine sulphate gr. 1/500, to check secretion and an alkali to neutralize the acid. The belladonna is given before food is taken. When continued for some time use the small doses recommended above in order to prevent physiological symptoms, though a larger dose may be given at first, if needed. The choice of an alkali will depend upon the condition of the bowels, magnesia usta if constipated, and creta praecipitata if the bowels are loose, soda bicarbonate being added to either if needed. The dose will vary from gr. v, to gr. xv, depending upon the amount of acid to be neutralized. The time for taking the alkali will vary with the amount of food, for we should allow the latter an opportunity to combine with the acid before neutralizing the excess. A favorite prescription is the following:—

℞ Atropinae Sulphatis, gr. 1/16.
Chlorali Hydrati, ʒss.
Magmae Magnesiae, ʒiv.
M. Sig., ʒi one hour p. c.
also—
℞ Sodii Bicarbonatis, gr. vii.
Magnesiae Ustae, or Cretae Praecipitatae, gr. vii.
Olei Faeniculi, m. ss.
M. et ft. Chart No. 1.
Métte talis No. 1.
Sig., one powder about one hour p. c. and repeat as needed.

Salinger gives the following:—

℞ Magnesiae Ustae.
Sodii Carbonatis.
Kali Carbonatis, aa 5 parts.
Pow Rad. Rhei, 10 parts.
Sacch. Lactis, 25 parts.
M. Sig., every hour enough to cover tip of knife.

A salt-free diet will also reduce acidity. Peristaltic unrest and pylorospasm will usually respond to full doses of belladonna or atropine.

Constipation, during an acute exacerbation of the disease, should be treated with enemas, but in the stage of quiescence, we may use a modification of the Carlsbad salts.

℞ Sodii Sulphatis, ʒiii.
Sodii Bicarbonatis, ʒi.
Sodii Chloridi, ʒss.
M. Sig., a teaspoonful in water before breakfast.

Liquid paraffin is often well tolerated. If the case is being treated with the duodenal tube, it is a simple matter to introduce through it some laxative in solution, or to irrigate the entire intestinal tract with saline solution. (Jutte's transduodenal lavage.)

Pain, if acute, may occasionally require a hypodermic of morphine. Much comfort may be obtained from large flaxseed poultices, applied to the epigastrium, but in cases of recent hemorrhage it is not a safe remedy and the ice bag should be substituted. The following prescription will be found helpful:—

℞ Orthoform.
Anaesthesin, aa gr. v.
Bismuthi Subcarbonatis, gr. xx.
M. et ft. Chart No. 1.
Sig., one powder every two or three hours.

An occasional dose of bismuth subcarbonate ʒii to ʒiv in oil, often has a good effect.

Belladonna in full doses will help the

pain due to spasm, or over-secretion. Alkalies relieve the pain of over-secretion.

Vomiting is usually relieved by the same treatment prescribed for pain. I add to the prescription above cerium oxalate gr. v. Salinger recommends tr. iodine, five drops three times daily, in water. In stubborn cases it is well to try putting the stomach absolutely at rest, not even taking water by mouth. Thirst may be relieved by the Murphy drip.

Hemorrhage. When of the sudden extensive type the patient should be kept absolutely quiet in the recumbent position. Morphine should be given hypodermatically in sufficient quantity to produce physiological symptoms, an ice bag placed over the epigastrium and a tourniquet applied to the extremities, tight enough to cut off the venous return without obstructing the arterial flow. Ergot, hypodermatically, is recommended, but, personally, I have obtained no results from it. Lavage, with ice water, is also recommended by Ewald. In one of my cases this seemed to check a hemorrhage that did not respond to other treatment. Gelatine solution, 2%, may be given subcutaneously. In the less severe hemorrhages, ten to twenty drops of adrenalin chloride solution, 1-1000, given every hour or two, also helps. Gelatine may be given by mouth and calcium lactate gr. x, every two or three hours. Bismuth subgallate gr. xx to gr. xxx, is sometimes effective. Intravenous infusion is recommended by Salinger, but seems to me questionable on account of diminishing the clotting properties of the blood.

Following the hemorrhage the usual remedies for shock may be required. The indications for operation will be considered under surgical treatment.

Adhesions.—After healing the ulcer they may sometimes be successfully treated by deep abdominal massage, combined with the hypodermic administration of thiosinamin. Bassler recommends the X-ray, with which I have no personal experience. Boardman Reed uses the high frequency current.

Surgical Treatment.

As stated above, cases of perforation, pyloric stenosis with commencing dilatation of the stomach, and suspected malignant degeneration are always surgical. In other cases, if the patient has had the systematic treatment recommended above, with careful control during the stage of convalescence, supplemented when necessary with the more vigorous regime of rest and rectal feeding, and symptoms persist, or recur, I believe the case to be surgical and so advise.

The surgical treatment usually resolves itself into a question of whether to resect, or to do a gastro-enterostomy, or both. I have never thought it advisable to do the Finney operation, since, as Keen observes, the mortality is higher and the results are not so good, as in gastro-enterostomy. I should, however, consider it the operation of choice, when, in addition to pyloric obstruction, the patient had a well marked gastroptosis, as the weight of the stomach on the transverse colon is apt to interfere with the results, should the ordinary gastro-enterostomy be used in these cases.

Gastric ulcers, readily accessible, particularly when non-obstructing, should be resected because of the tendency to malignant degeneration, but if this adds greatly to the hazard of the operation, I do not believe it is justifiable, since it is probable that the tendency to malignancy becomes more remote with the taking away of all irritation by a gastro-enterostomy. Duodenal ulcers so rarely become malignant, that I have never resected them and, in fact, have seldom found them suitable for resection.

Posterior gastro-enterostomy is the operation of choice in duodenal ulcers, gastric ulcers involving the pylorus, and ulcer of the general surface of the stomach that cannot be resected. Permanent closure of the pylorus should be combined with this, if the pylorus is not obstructed. The following technic is the one which I usually employ. If the stomach is foul from fermenting food, it is washed twice daily, for two or three days before the operation, with some mild antiseptic solution, such as salicylic acid gr. xx, boric acid ʒi in each pint of water. An antiseptic mouth wash is used, as alcohol ʒi, glycerine ʒiii, water ʒvi. The teeth are

cleaned, preferably by a dentist. The bowels are thoroughly evacuated, and one hour before operation I give a small dose of morphine and atrophine sulphate hypodermatically. Under combined gas and ether anaesthesia, a four-inch incision is made above the naval, slightly to the right of the median line. I inspect the pylorus, and if it is to be closed artificially, insert a linen suture at the highest and lowest points, which can be used temporarily for retraction. Between these points three linen Lembert sutures are placed, catching the stomach on one side, and the duodenum on the other, and are tied and cut short. These are inserted deep enough to catch the muscle layer firmly. The traction sutures which have been inserted in the same way are then tied, but left long. A row of interrupted, chronic-gut sutures is then inserted in the same way as the linen thread, and at the upper and lower angle a second layer is caught up in traction sutures. A third layer of linen sutures is then inserted and tied. The transverse colon is drawn out of the abdomen, displaced upward and protected by moist pads, so that it does not come in contact with the abdominal wall. The jejunum is found where it passes through the transverse mesocolon to the left of the spine, is drawn downward, and if its suspensary ligament projects forward on to the mesocolon it is divided. The stomach is pressed downward from above and where it projects most prominently, an opening is made in the mesocolon, large enough to admit three fingers, preferably slightly to the left of the median line, where ample room is found free from blood vessels, and well back toward the vertebral column. We next decide whether the anastomosis should be made with the intestinal loop directed to the left, obliquely downward, or to the right. I have made the anastomosis in all these positions and apparently with no difference in the results. The location of the opening in the mesocolon determines my choice of position. If the gut is placed from right to left, the opening should be well to the left of the median line, as otherwise some angulation may be produced. The oblique downward position is most frequently chosen. The stomach is forced downward into the opening in the mesocolon and grasped from below. The blood vessels on the greater curvature are displaced as far as possible and, with a Lane or Roosevelt clamp, placed so that the tip points upward, toward the ensiform, the stomach is drawn into the clamp in such a way that when returned to the abdomen, our incision will extend on the posterior wall, downward and to the right, terminating at the greater curvature. The clamp is then rotated so that the tip points to the right.

The jejunum is caught up with Allis forceps, and drawn into the other blade of the clamp. All except the parts held in the clamp are returned into the abdomen and moist pads are packed firmly under and around the clamp. With a long, straight intestinal needle and fine linen thread, two feet long, a continuous suture is made between jejunum and stomach, for three and one-half inches. This suture catches the muscle layer firmly and care is taken to draw each stitch tight. The threaded needle is laid aside and covered with a towel, as this suture is to be continued later, and with a scalpel a two and one-half-inch incision is made down to, but not through, the mucous membrane of the stomach, one-half inch from the suture line, allowing the latter to project one-half inch beyond each end of the incision. A similar parallel incision is made in the jejunum, but one-fourth inch shorter. Extra pads are then placed about the parts and the incisions are carried through the mucous membrane, the discharge being carefully sponged away and soiled pads removed and replaced by fresh ones. The protruding mucous membrane on the intestinal side is usually cut away and also on the stomach side, if it is redundant. With a straight needle, threaded with linen, the distal angles are united and tied, leaving a long end, and a running suture is inserted, care being taken to include on both sides the serous coats, which are apt to retract, as well as the muscle layer and mucous membrane. When we reach the proximal angle the

sutures pass from the mucous to the serous coat of the intestine, and from the serous to the mucous coat of the stomach; then, back through the stomach from the mucous to the serous coat, and on the intestinal side from the serous to the mucous, and from the mucous to the serous and repeat. When half through with this layer, if we find that we have redundant tissue on the intestinal side, it is well to thread the other end of this suture and sew back from the distal angle, to the point we have left, so that any puckering required on the gut side will not be at the angles. This can be prevented if we remember to make our intestinal incision slightly shorter than the gastric.

The clamp is then loosened and, if hemorrhage occurs, it is checked. The first needle, which has been covered with a towel, is then taken up and this line of suture is completed. At the lower angle, a single interrupted suture of linen thread is usually inserted beyond the outer suture line, to prevent traction on the latter. With plain catgut No. 2, the opening in the mesocolon is sutured to the stomach, catching the under surface of the mesocolon, not the edge of the opening, and uniting it to the stomach one-half inch from the line of anastomosis. These sutures are interrupted and usually are four or five in number.

The parts are then returned to the abdomen, the jejunum being swung into the position it will most advantageously occupy, and the abdomen is closed in the usual way.

There are some special points to which I would particularly refer. Do not allow puckering at the angles, and be sure to close the rent in the mesocolon. Divide the suspensary ligament of the jejunum if too long. Avoid a long loop, or one so short that there is undue tension on the jejunum. See that there is no kinking of the jejunum, which may easily occur. Do not take up too much of the bowel in the double row of sutures, as we may thus reduce the lumen of the gut to the point of causing obstruction. Use Pagenstecher for both rows of sutures, as chromic gut must necessarily be very quickly digested by the gastric secretions. The inner suture line may be interrupted at one or two points, as recommended by Wyeth, if desired.

After Treatment.

The patient should be placed in the Fowler position and the Murphy drip used. Hypodermic injections of strychnine sulphate are given every four to six hours, to increase peristalsis. Water or a little clear tea may be given as soon as nausea disappears, and this is quickly followed by milk, soups and egg-nog. Soft solids are added about the fourth or fifth day, if desired by patient. Morphine is usually given the first night. In forty-eight hours an enema is given, consisting of croton oil M. ii, olive oil, castor oil and glycerine each ℥ii. About the fifth day I give blue mass, gr. x, and one compound cathartic pill at night, to be followed on the next day by magnesium sulphate.

In Hemorrhage, operation is not justified during the active stage, since the mortality is much higher in cases treated surgically than those treated medically. However, recurring hemorrhages, not responding to treatment, are an indication for operation.

Stenosis of the Pylorus, when due to cicatricial contraction, should be treated by gastro-enterostomy, while a stenosis due to pylorospasm as found frequently in duodenal ulcer, will often respond to the medical treatment of the ulcer. I have performed the old operation of pyloroplasty in pylorospasm with good results. This consists in making an incision of suitable length in the anterior wall of the stomach and duodenum, its center crossing the pylorus. It is then retracted vertically, bringing the two ends of the incision in apposition, and closed in this position with a double row of Pagenstecher sutures, thus widening the lumen of the pyloric opening.

In Perforated Ulcer the indications are for immediate surgical intervention, unless the shock is profound, in which case we may wait an hour or so for reaction to take place, but we must remember that the mortality is greatly increased by undue delay. It is my custom to give these patients a preliminary hypodermic injec-

tion of morphine, and such stimulants as may seem necessary. The foot of the bed is kept elevated. There is no other preparation. Special instructions are given not to wash out the stomach.

If the shock is considerable, I go through the abdomen with local anaesthesia only, using a 1/10% cocaine solution, after which the general anaesthetic is administered. Otherwise, I start with general anaesthesia, and incise as for the ordinary gastro-enterostomy. The perforation is located as quickly as possible, usually close to the pylorus, on or near the lesser curvature. In my own series of twenty-five cases, I have found it possible to close the perforations with Pagenstecher as a purse string suture in most cases, but occasionally the Lembert works better. A double tier of sutures is inserted.

If the patient's condition permits, a posterior gastro-enterostomy is also performed at once. In some cases, however, it is not justifiable to prolong the operation for this purpose. A small incision is made in the right inguinal region, and a cigarette drain is passed down to the pelvis. In the upper incision three cigarette drains are placed, one between the liver and diaphragm, one in the right kidney region and one to the point of perforation.

The abdominal cavity is not irrigated, unless extensively contaminated by the escape of foreign matter from the stomach, but we sponge out the pelvis and right kidney fossa. In closing the abdomen it is well to reinforce the sutures in the deep fascia with a few interrupted kangaroo tendon sutures. Wash the stomach before closing the abdomen.

Following operation, the patients are placed in bed with the head elevated. If it does not interfere with respiration, they are turned over on the abdomen, or nearly so, to facilitate drainage.

If gastro-enterostomy has been performed, we can treat the cases as described above in operating for uncomplicated ulcer, but if not, great care must be observed in the feeding, following the method we would use for the medical treatment of ulcer in the early stages.

The drains are removed gradually. We usually have them out, with the exception of a small drain in the upper wound, at the end of the first week.

In perigastric, or subphrenic abscess, as found after slow perforation, or complicating the acute, the indications are for free incision and drainage. In the subphrenic type I have found it desirable to follow the transpleural route (two cases) with the resection of a portion of a rib and using through drainage.

Hour Glass Stomach requires operation, but the method to be followed will depend upon the nature and extent of the deformity. It will usually be necessary to drain both cavities, but if possible it will be better to drain the cavity in the region of the fundus into the pyloric portion, by doing a gastro-gastrostomy, and then a gastro-enterostomy with the pyloric portion of the stomach, or, if practical, resect the lower cavity and do a gastro-enterostomy with the upper one.

Perigastric Adhesions should not be treated surgically, if it can be avoided, but occasionally we are forced to do so, because of pain or interference with function. Breaking these down usually does only temporary good, on account of their tendency to re-form, but sometimes after dividing them we can change the relation of the parts in such a way that they are less troublesome when they again develop. Usually, however, when these cases come to the point of requiring surgery, it means a gastro-enterostomy and possible resection of the pylorus.

Vicious Circle is not very common, but has occurred in two of my cases. According to Mayo Robson it may be prevented by observing the following points:—

1. Accurate union of mucous margins.
2. Securing the anastomotic opening at or near the lower border of the stomach.
3. Applying one or more anchor sutures beyond the point of anastomosis.
4. Bringing the distal loop of the jejunum over to the right of the spine in arranging the peritoneal toilet.
5. Making the anastomosis in the posterior operation, either without a loop or with a very short interval between the anastomosis and the jejunal flexure.

6. In the anterior operation the loop must not be too short.

To these I would add the following:—

7. When jejunum is small do not sacrifice an unnecessary amount of tissue in the suture lines, as it is possible in this way to narrow the lumen of the bowel considerably.

8. Do not draw the jejunum forward too tightly in making the anastomosis, for in a thin patient it is possible to get sufficient traction to cause angulation at the duodeno-jejunal junction.

9. The jejunum should be sutured to the stomach in such a position as to avoid producing angulation at the duodeno-jejunal junction which will require us to vary the direction in which the bowel is turned, depending upon the point at which we open the stomach.

10. If the stomach sags considerably, we should shorten the gastro-hepatic ligament and possibly suspend the transverse colon by suturing the omentum to the abdominal wall (Coffey's operation), in order to prevent traction at the point of anastomosis.

When the vicious circle is established, it is necessary to do an enteroanastomosis, or close the pylorus, or both.

Conclusions.

1. Every ulcer should be treated medically before resorting to surgery, save in certain conditions mentioned below.

2. Three months should be devoted to active treatment, and for a year strict attention should be given to diet and hygiene.

3. The Rest and Rectal Feeding Method of Williams and Donken is useful in cases of unusual irritability of the stomach, and when there is severe pain or recent hemorrhage. In many cases it is used for the first few days of treatment, but as a routine procedure it is extreme and unnecessary.

4. Debove's Milk and Neutralization Method is good in cases with continuous secretion.

5. The use of silver nitrate, alkalies, belladonna and bismuth subcarbonate may be an important part of the treatment.

6. Lenhartz's treatment produces good results, but in my judgment is not as good as the Von Leube treatment in cases of recent hemorrhage.

7. Feeding by means of the duodenal tube is recommended in cases with subacute and chronic symptoms, providing it does not act as a mechanical irritant.

8. Special treatment may be required for anaemia, over-secretion, constipation, pain, vomiting, hemorrhage and adhesions.

9. Hemorrhage of the sudden extensive type should be treated medically. Repeated hemorrhages should be first treated medically, but if persisting, require operation.

10. Operation is indicated in perforation, pyloric stenosis with commencing dilatation, malignant degeneration, and in all cases that do not respond to medical treatment.

11. Non-obstructive gastric ulcer requiring operation should be resected if accessible, but this is not indicated in duodenal ulcer.

12. Usually the operation of choice is posterior gastro-enterostomy, combined with permanent closure of the pylorus, if there is no obstruction.

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